MOTOTRBO™

2013 MOTOTRBO ADP CONFERENCE

MOTOTRBO Network Interface Service
(IP Wireline Data Gateway)

MOTOTRBO ADP GLOBAL ENGINEERING

Topics

- **MNIS Deployment Types**
- **MNIS Interface Overview**
- **Data Service Comparison with Control Station Interface**
- **Migration to MNIS Interface**
- **MNIS Capacities**

- **What is New in DDMS**
- **Passive PN**
- **What is New in R2.3 (AES)**
- **Router Requirement**

Control Station Based Deployment

Advantages:
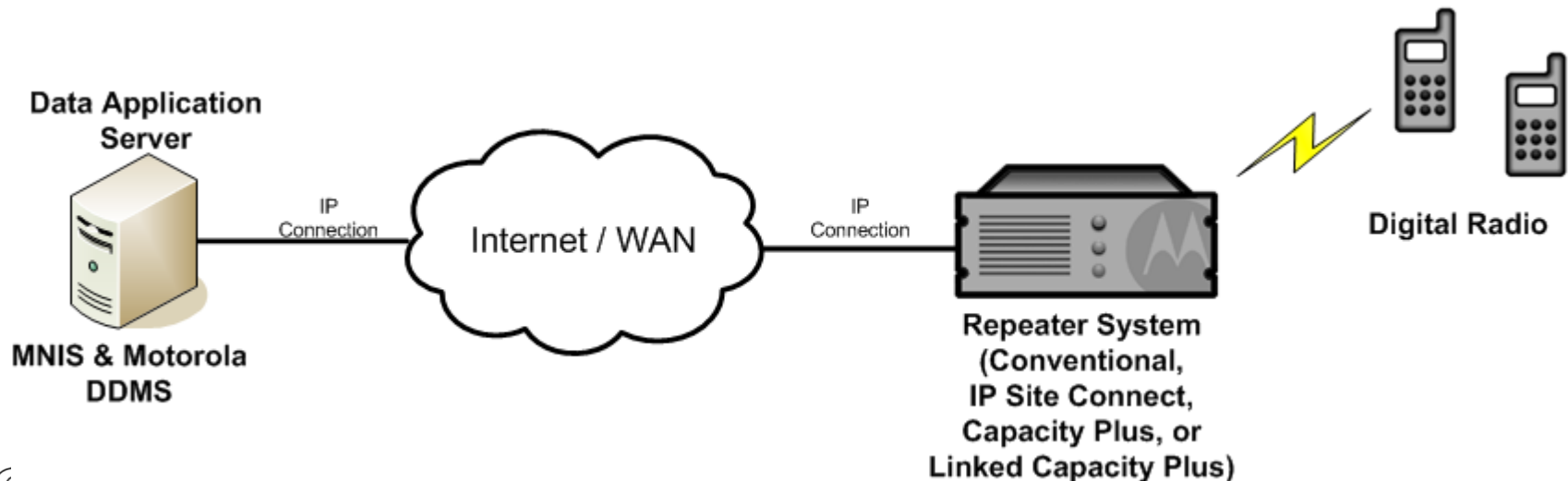- Easy to set up
- Support all the data services

Disadvantages:
- Equipment Cost
- Must be within RF coverage
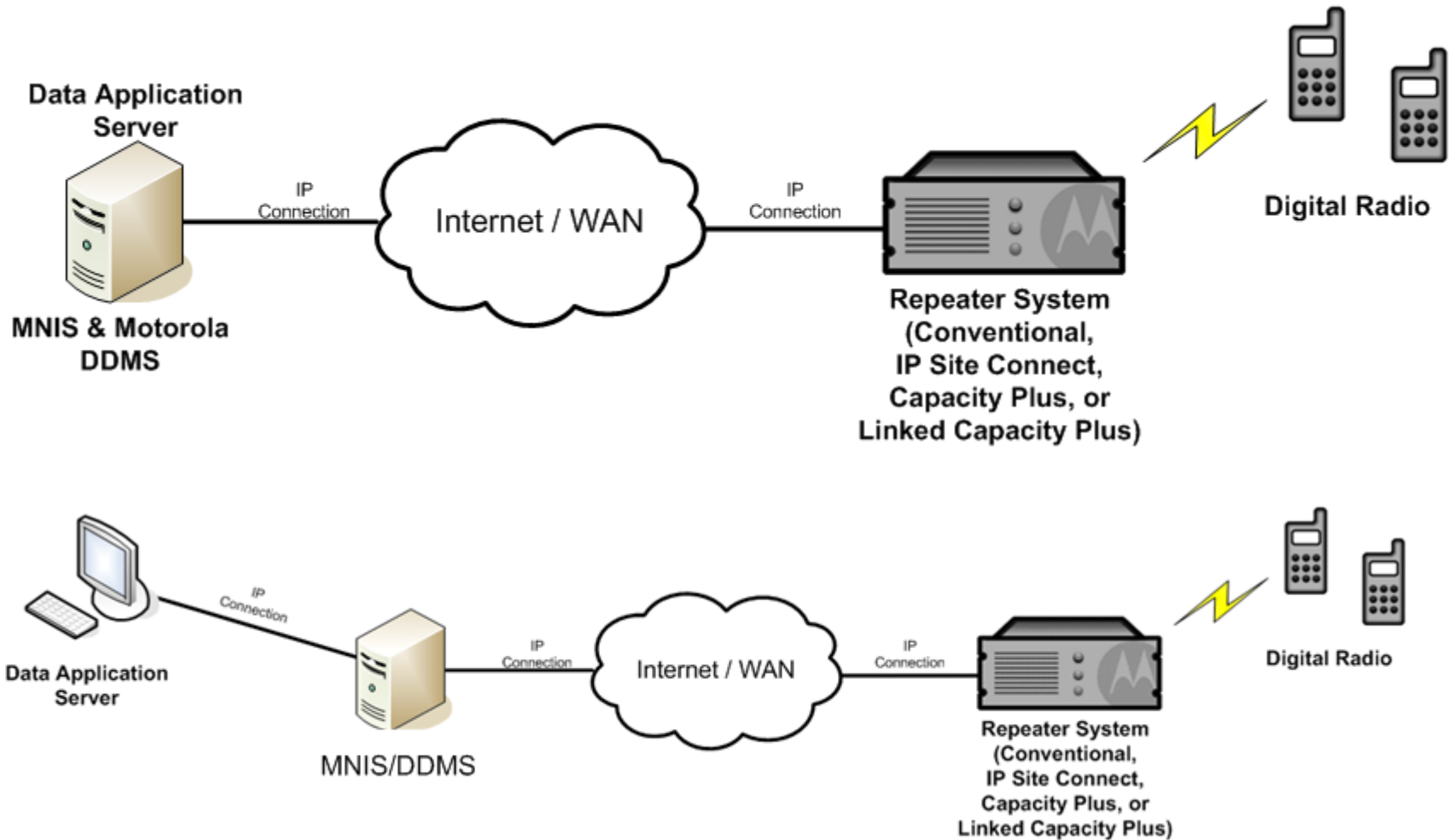- Limited talkgroup supported per control station

MOTOTRBO Network Interface Service Overview

- IP connection into the radio system, does not have to be within RF coverage
- Compatible data interface as control station: UDP/IP socket based
- Major functions provided:
    1. Bi-direction data call
    2. All the data services: data over voice interruption, UDP header compression, encryption/decryption, data throughput improvement

Data Application Server

IP Connection

Internet / WAN

IP Connection

MNIS & Motorola DDMS

Repeater System (Conventional, IP Site Connect, Capacity Plus, or Linked Capacity Plus)

Digital Radio

MNIS Based Deployment

Data Services

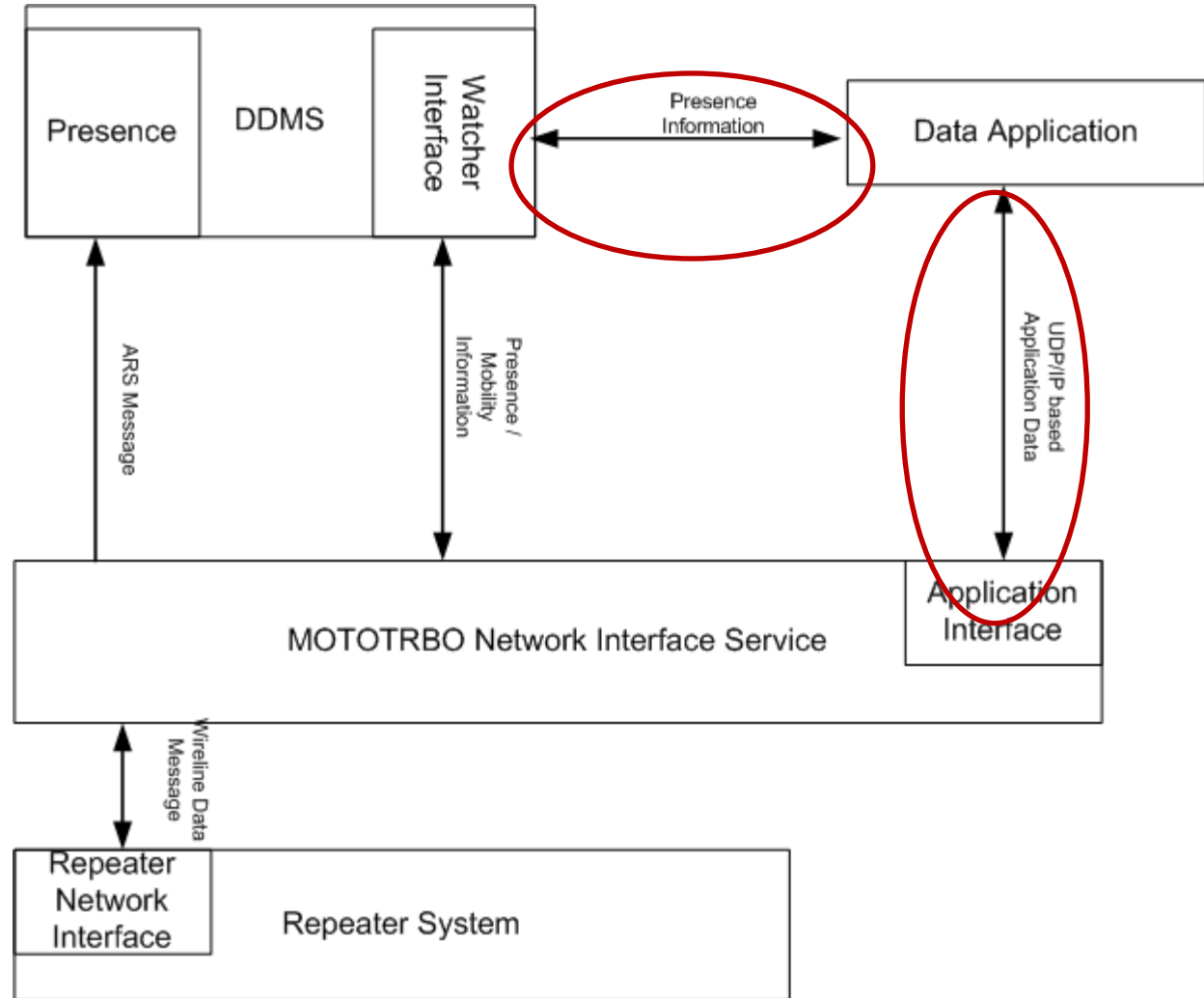| Services	MNIS	Control Station
Confirmed/Unconfirmed L2 Transmission	Yes (per UDP port)	Yes (per channel)
UDP Header Compression	Yes	Yes
Basic/Enhanced Privacy/AES	Yes	Yes
Unbuffered Data/Immediate Data/Priority Data	Yes	Yes
ICMP	Yes	Yes
RX Group List	Up to 16 Group Ranges	1 Group Range with 16 Members
Channel Access	Normal or Data Centric	Normal
Port Forwarding	Source Port or Destination Port	No

Data Services (cont)

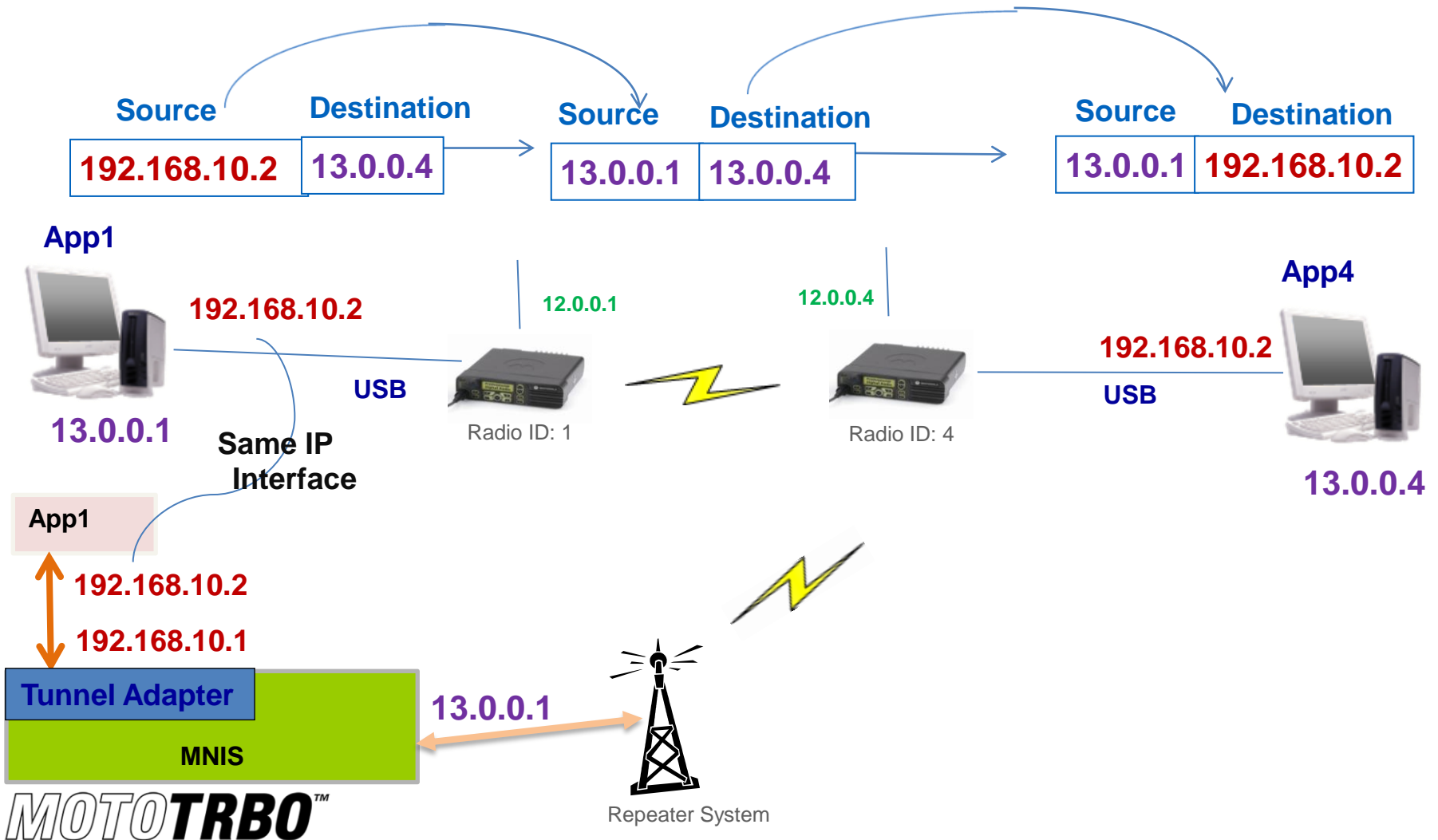| Services	MNIS	Control Station
Minimal CSBK based Window Size	1	2
Support CSBK based Location Report in Multisite System	Yes	No
Shorter Over-the-air flight time	One Hop of OTA Transmisstion	Two Hops of OTA Transmission
Diagnostic Statistic Report	Native Support	Rely on Third Party Application
Automatic Routing Table Update	Yes	No

MNIS Interface

- UDP/IP based Application Data Interface
- MOTOTRBO Device Discovery and Mobility Service (DDMS) Watcher Interface
- MOTOTRBO PN Interface
- Wireline Repeater Interface

UDP/IP Based Application Data Interface

- App1 sends message to App4

Source	Destination		Source	Destination		Source	Destination
192.168.10.2	13.0.0.4		13.0.0.1	13.0.0.4		13.0.0.1	192.168.10.2

App1

192.168.10.2

USB

12.0.0.1

12.0.0.4

App4

192.168.10.2

USB

13.0.0.1

Same IP Interface

Radio ID: 1

Radio ID: 4

13.0.0.4

App1

192.168.10.2

192.168.10.1

Tunnel Adapter

MNIS

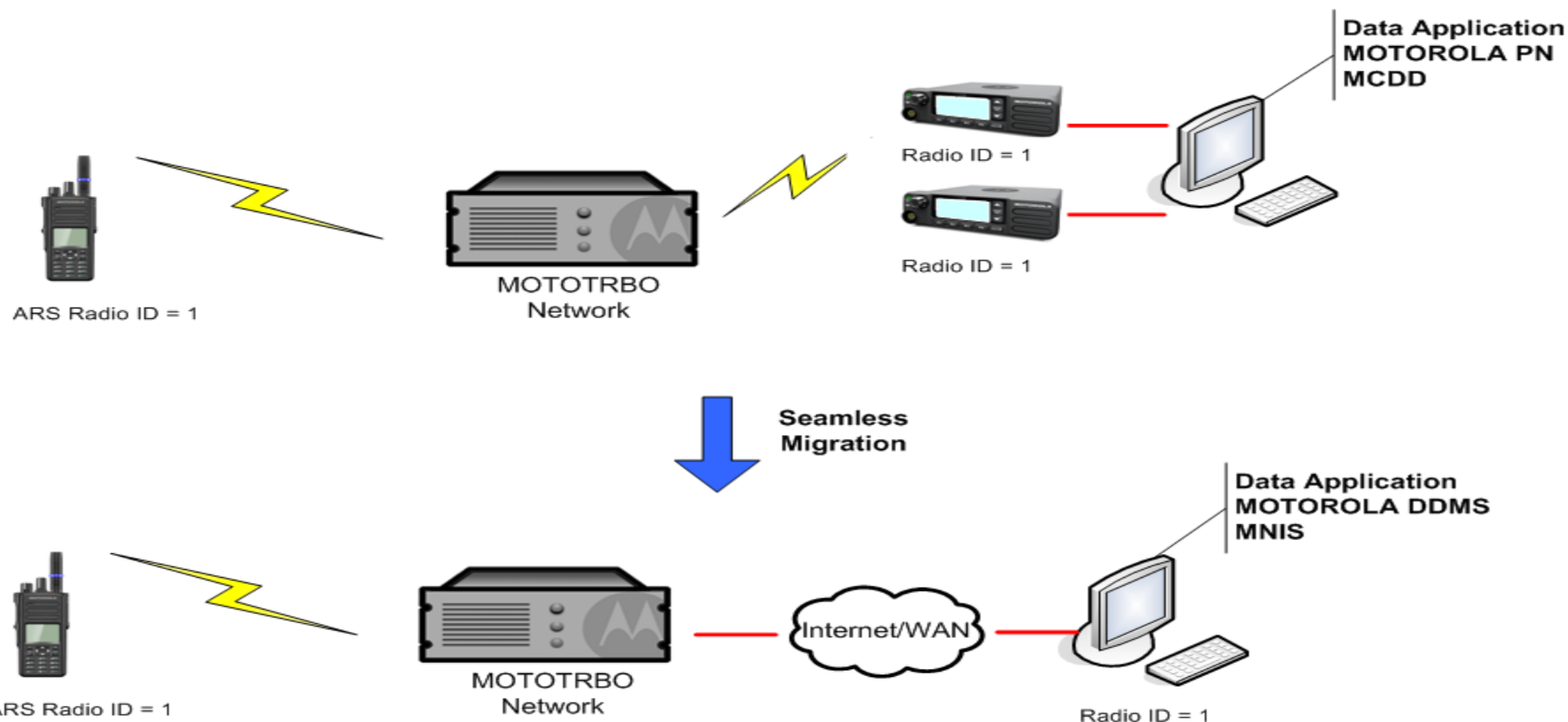13.0.0.1

Repeater System

Migration to the MNIS

- Application Layer Protocol
- IP Routing/Address Translation
- Data Services (transmit interrupt, UDP header compression…)
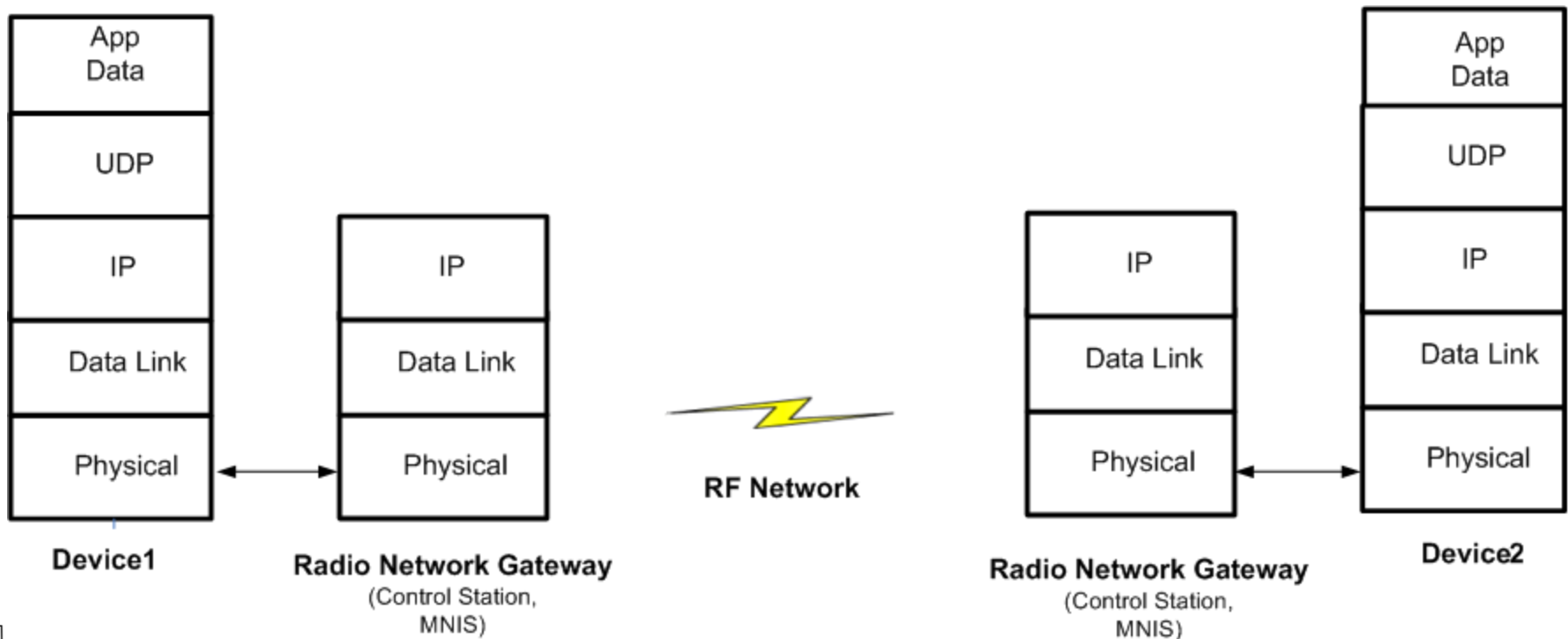
Seamless Migration to MNIS Interface

- No Application Change assuming MOTOROLA PN and MCDD are used

MNIS Supported Systems

Supported:
- **Single Site Conventional (excluding Talkaround)**
- **IP Site Connect (Wide/Local Area Channel)**
- **Capacity Plus**
- **Linked Capacity Plus**
- **Data Revert Channel**
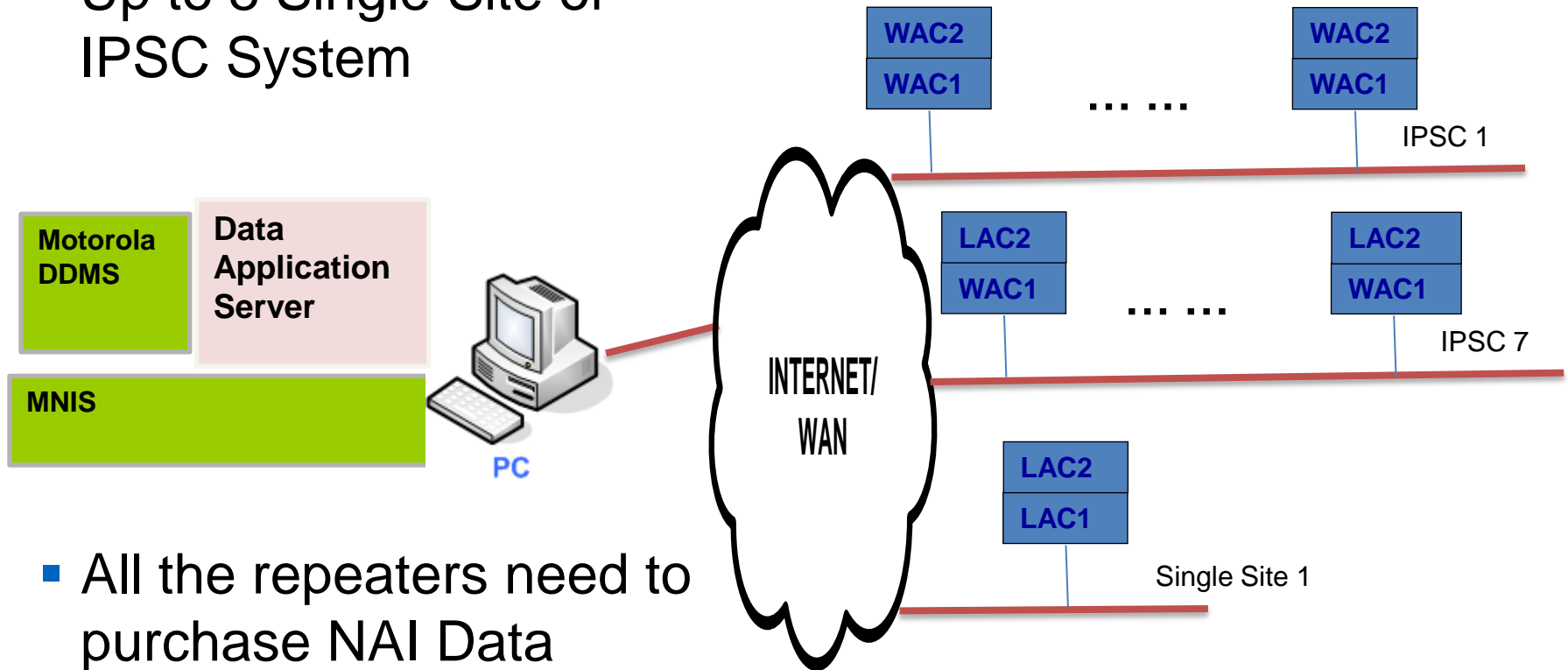- **Enhanced GPS Revert Channel**

Not Supported
- **Analog**
- **Analog and Digital Mixed Mode**

MNIS with Conventional System

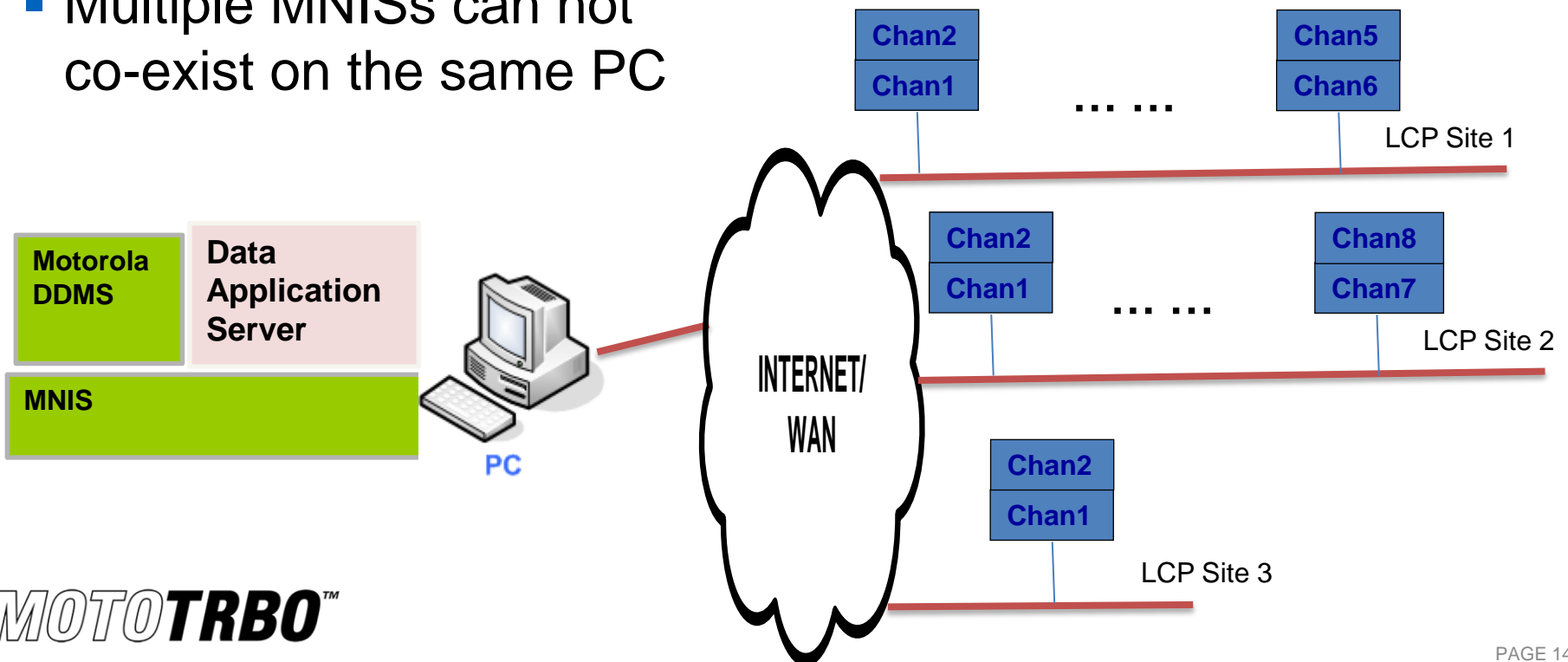- One MNIS can Support Up to 8 Single Site or IPSC System

- All the repeaters need to purchase NAI Data feature

MOTOTRBO™

MNIS with Trunking System

- One MNIS can support One Capacity Plus System or Linked Capacity Plus System
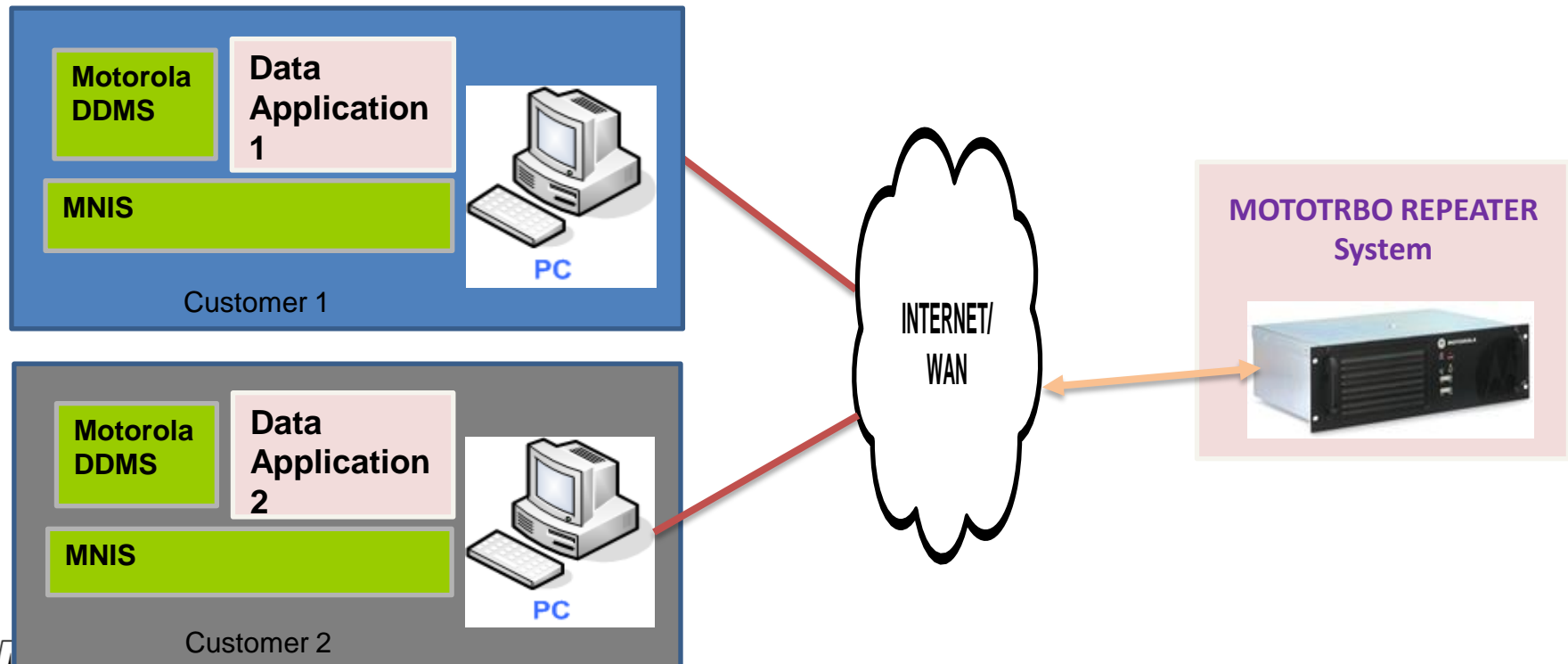- Multiple MNISs can not co-exist on the same PC

- All the repeaters need to purchase NAI Data feature

Multiple MNISs in One Repeater System

- Max 4 MNISs in one system
- One MNIS will not impact the number of sites (e.g. 15 site IPSC system + 1 Data Gateway)
- Two or three MNIS will reduce one site. (e.g. 14 site IPSC)
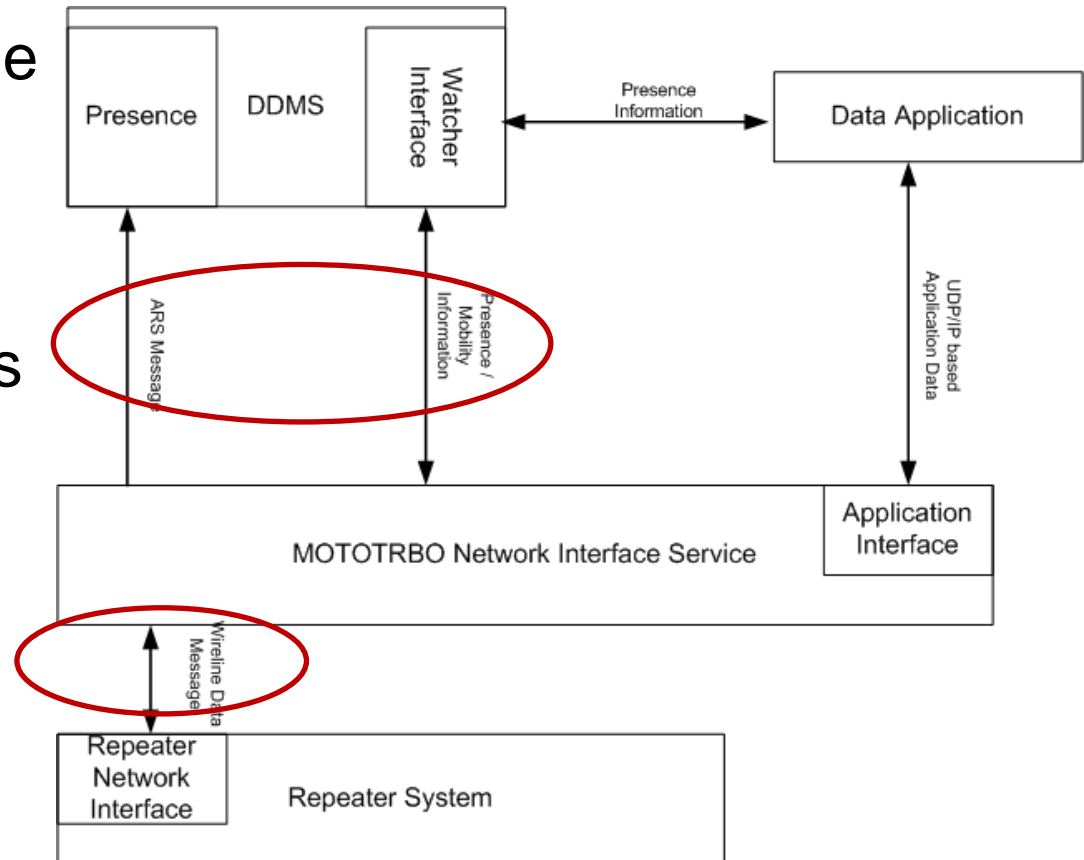- Four MNIS will reduce two sites. (e.g. 13 site IPSC)

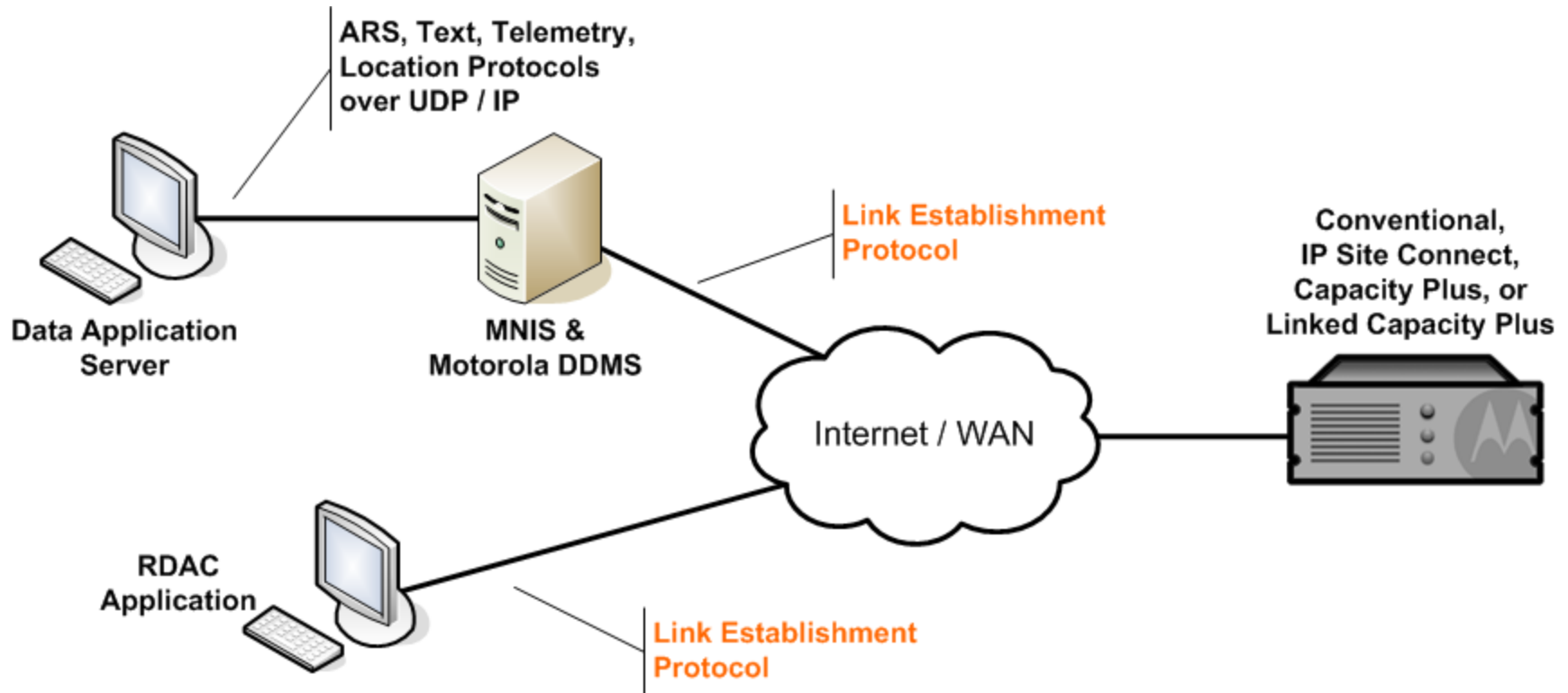# What are the major configuration parameters in MNIS?

MNIS Key Parameters

- System Operation Mode
- Application ID
- LE Peer ID
- Receiving Group List
- Master Peer IP Address
- Master Peer UDP Port
- CAI Network
- CAI Group Network
- DDMS Server Address
- Watcher Port
- Port Forwarding Rules

MNIS in RDAC Application

- Can indicate the connection with DDMS and Tunnel status
- Cannot indicate the connection with other repeaters
- Cannot control MNIS or receive alarm from MNIS

ARS, Text, Telemetry, Location Protocols over UDP / IP

Data Application Server

MNIS & Motorola DDMS

Link Establishment Protocol

Internet / WAN

Conventional, IP Site Connect, Capacity Plus, or Linked Capacity Plus

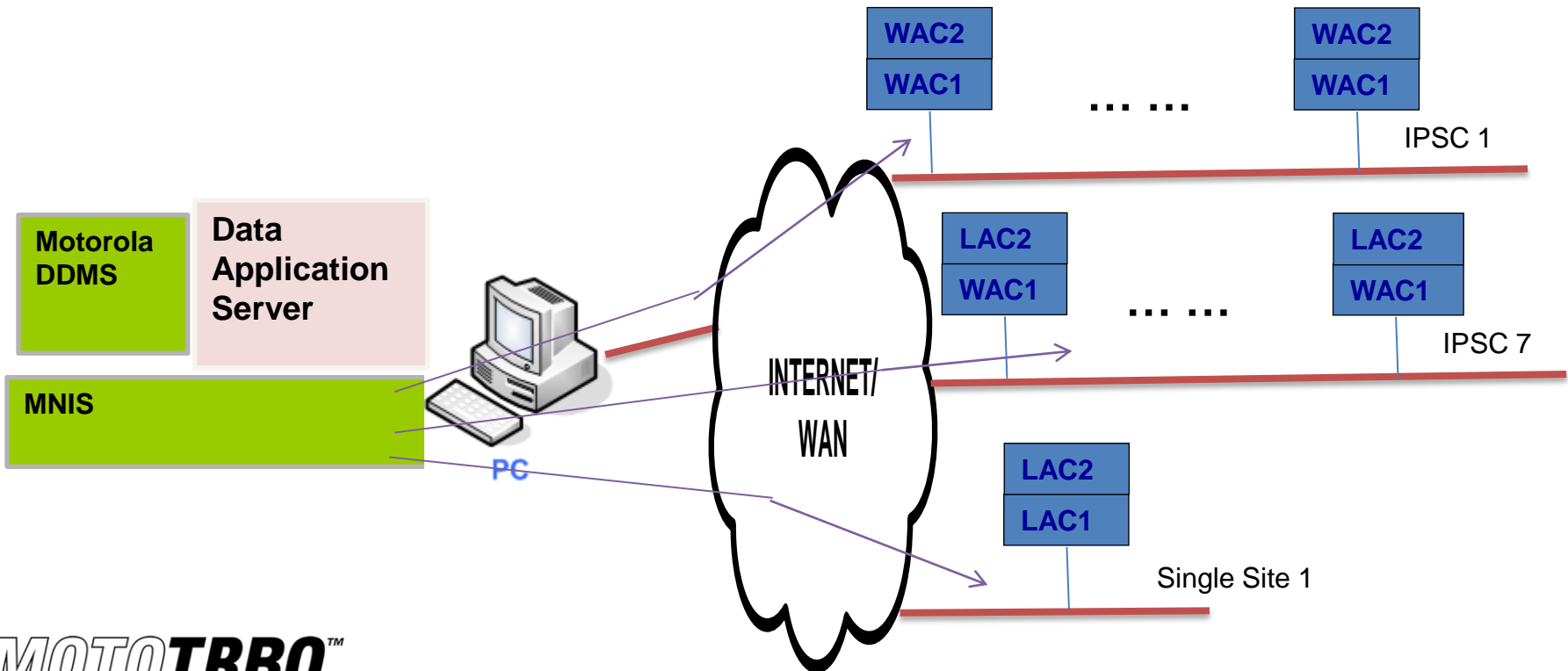RDAC Application

Link Establishment Protocol

What is New in DDMS?

- Besides presence the Motorola DDMS has radio routing parameters (based on the channel the ARS is received):
  - Radio IP Address
  - System Type - MotoTrbo, etc
  - System Mode – IPSC, CapPlus
  - System Domain – LE Master IP Address
  - Repeater ID of the – Peer ID of the repeater
  - Slot #

- DDMS has the radio capability information
  - CSBK data service

- MNIS requires Motorola DDMS to receive routing parameters and uses it to send the data to the destination radio

- Support Passive PN mode

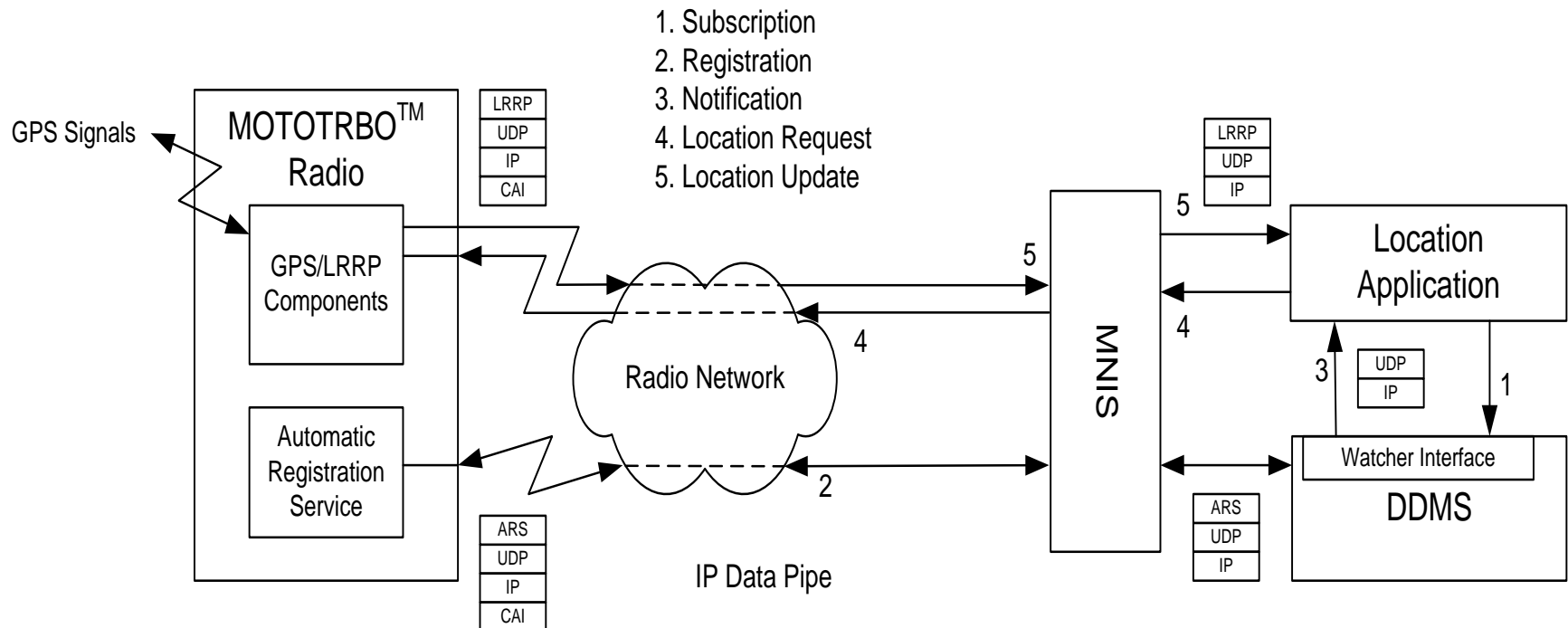# RF Resource Efficiency Rely on DDMS' Mobility Information

- MNIS sends packet to every slot in every connected system
- **DDMS is required**

Architecture Diagram of Location Services

- Same as the control station interface

1. Subscription
2. Registration
3. Notification
4. Location Request
5. Location Update

MOTOTRBO™ Radio

GPS Signals

LRRP
UDP
IP
CAI

GPS/LRRP Components

Automatic Registration Service

ARS
UDP
IP
CAI

Radio Network

IP Data Pipe

MNIS

LRRP
UDP
IP

ARS
UDP
IP

Location Application

UDP
IP

Watcher Interface

DDMS

MNIS and Motorola DDMS Supported Platforms

- Windows XP
- Windows Server 2003, 2008 R2
- Windows 7
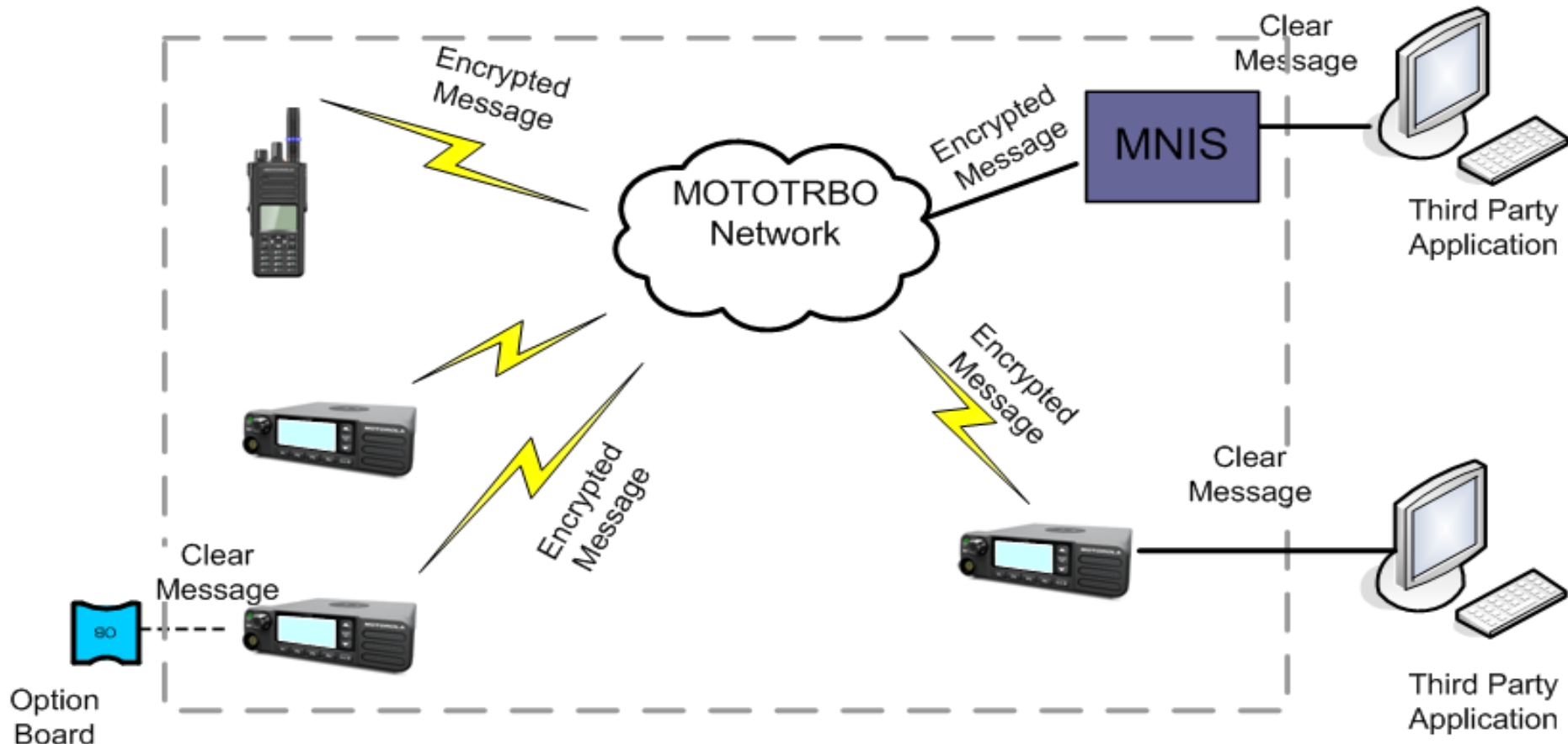- Windows 8

MOTOTRBO™

What is New in R2.3

- Advanced Encryption Standard (AES)
- CSBK Data Support (ARS, Location, Third Party XCMP Device Raw Data)

AES Encryption

- Encryption standard defined by National Institute of Standard
- 256 bit Key Length
- Supported by radio and MNIS
- Transparent to third party data application or XCMP device

AES Configuration

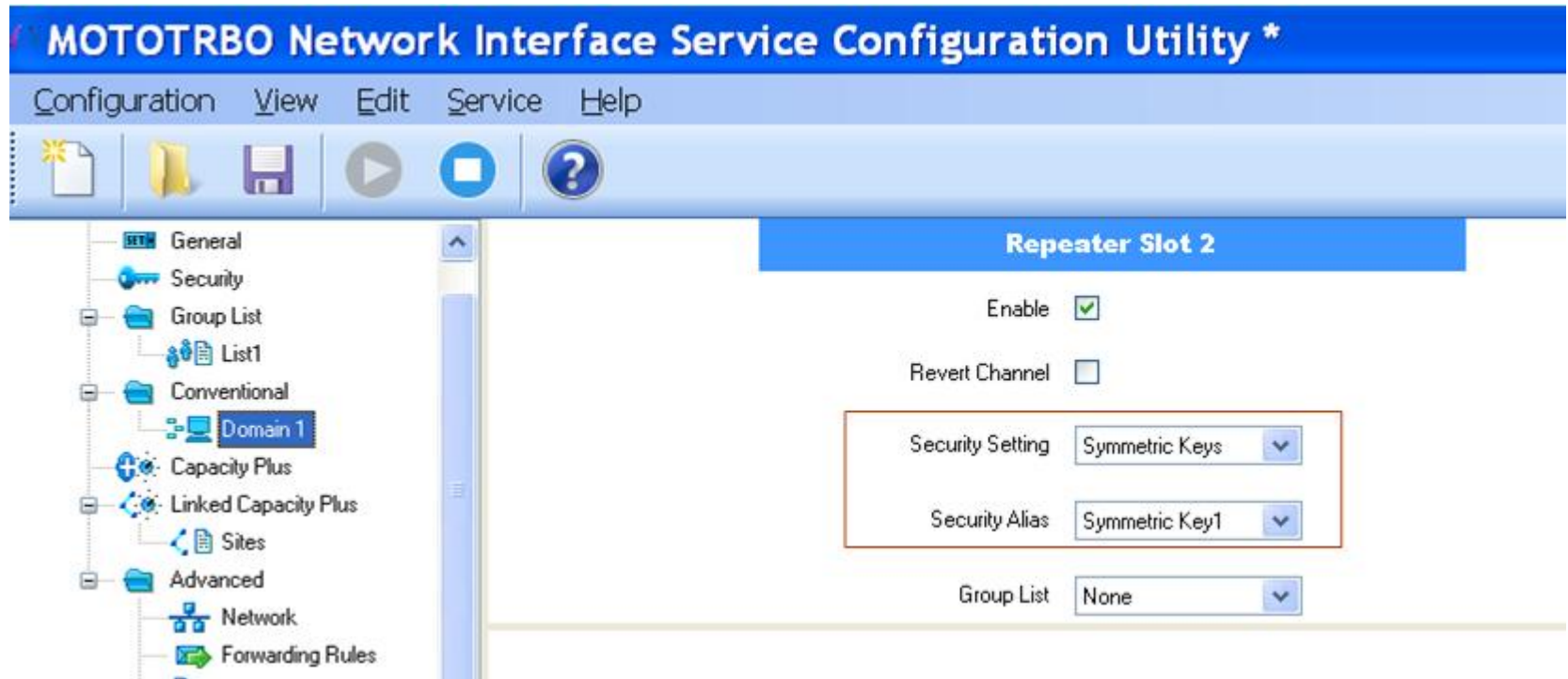- Potential List for Receiving and Transmission Purpose

AES Configuration

- For Transmission Purpose

Hair Pinning Router

- The origin end point and its router only knows the Destination's public IP address
- The source IP shall match the destination IP to accept the message
- Returning a message from an origin endpoint back in the direction it came from

Client 1
Private IP 10.1.1.2

Internet

Public IP 99.79.55.1

Private IP 10.1.1.254

Firewall/NAT

Private IP 10.1.1.1

Public IP 99.79.58.2

Client 2

99.79.55.1 Port: 4001

10.1.1.1 Port: 4001

Server

Location Server: 99.79.55.1 Port: 4001
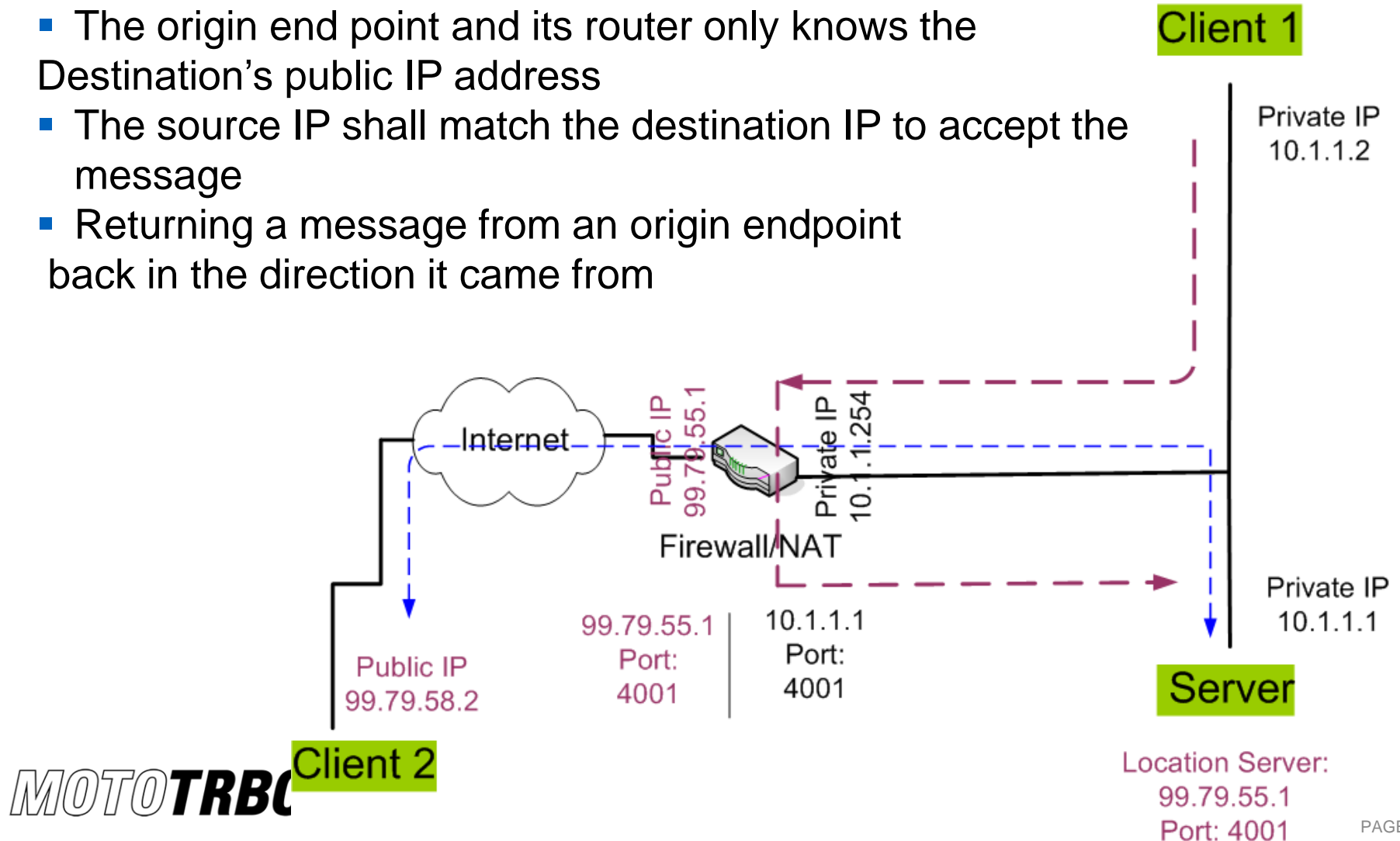
R2.2A Route Requirement

- ## IPSC
- If the IPSC sites are joined together into the same subnet using VPN then hair pinning router is not required.
- When VPN is not used and <u>more than one</u> networked applications *(such as MNIS, RDAC, or apps that connect to the repeaters directly)* or repeater are at the same subnet then hair pinning router is required for that subnet.

- ## Capacity Plus
- All the applications and the repeaters are in the same subnet then hair-pinning router is not required
- Hair-pinning router is required at the master site when the network applications are deployed on a different subnet
- Hair-pinning router is required at non-repeater subnet with <u>more than one</u> network applications.

- ## LCP
- All the network applications and the repeaters are in the same subnet as the Master peer then hair-pinning router is not required when deployed with <u>R2.2 LCP hair pinning enhancements</u>. The non-master repeater sites do not require hair-pinning routers.
- Hair-pinning router is required at non-master repeater site when <u>one or more</u> network application is deployed at the non-master repeater sites.
- Hair-pinning router is required at non-repeater subnet with <u>more than one</u> applications.

- NOTE: If the network applications are installed on the same PC then they are also on the same subnet

Hair-pinning router in Capacity Plus Example
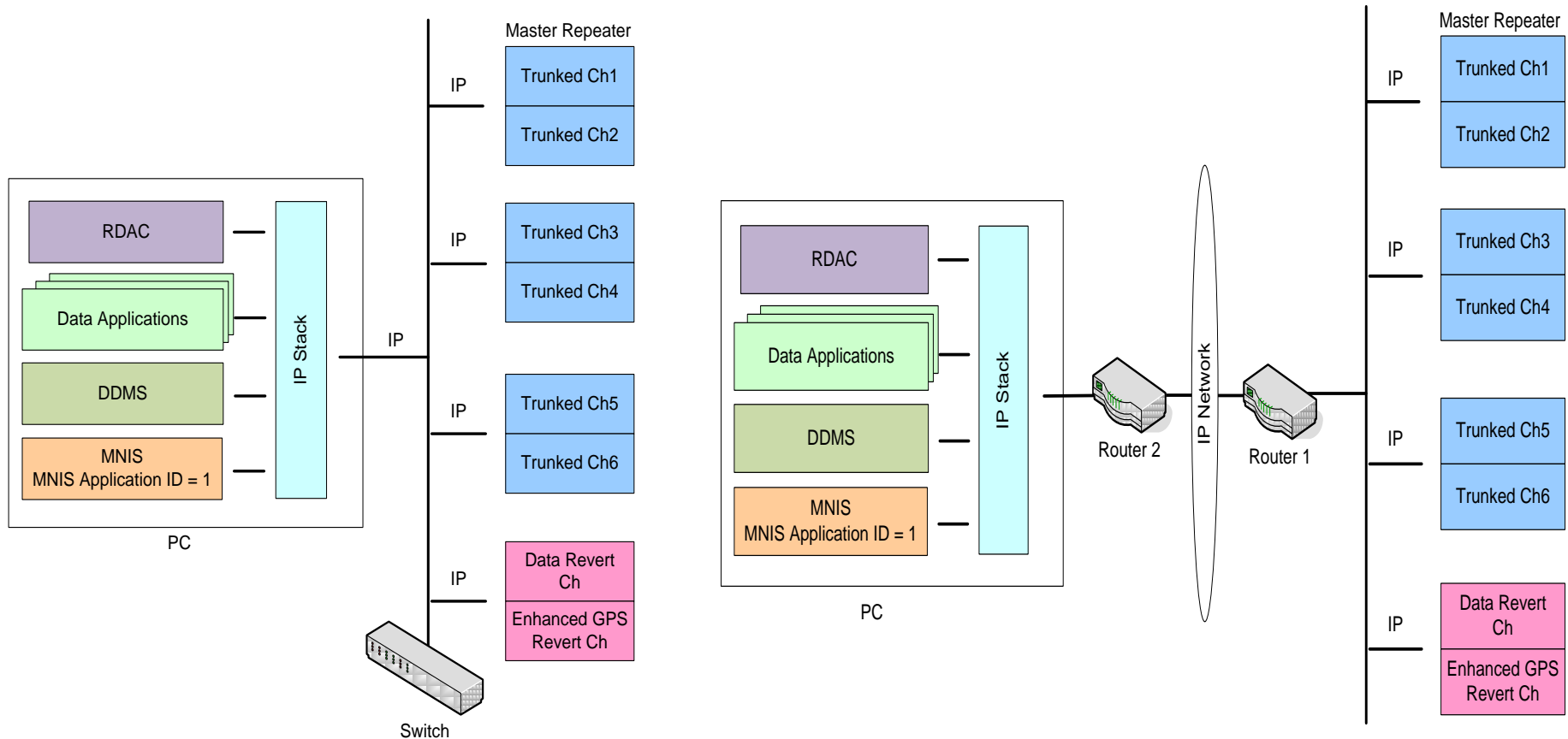
Hair-pinning router is <u>NOT</u> required when the MNIS and other networked apps (RDAC, Call Logging) are deployed on same LAN as the repeaters.

• Hair-pinning router (Router 1) is required at the repeater site when MNIS is deployed remotely.

• Router 2 is required to be hair-pinning if other networked apps (RDAC, Call Logging) are deployed behind router 2.

MNIS deployment with other apps

- MNIS, DDMS, RDAC, Radio Mgmt. can be deployed on the same PC
  - May require hair-pinning router in certain deployments

- MNIS and Control Station supporting voice dispatch can be deployed on the same PC
  - As long as control station is not used for data there should be any problem

- Only one MNIS can be deployed per PC

- Only one DDMS can be deployed per PC

THANK YOU!

QUIZ

- List 3 advantages of MNIS over Control Station

- How many single site systems can one MNIS support?

- Where and when shall we configure the ARS Monitor ID?

Multiple Applications – Source Port Forwarding

- Radio has fixed UDP port for each data service
- MNIS forwards the IP packet based on source port to different applications

Port Type	Port Number	Forward IP Address
Source Port	4001	10.1.1.2
Source Port	4007	10.1.1.1
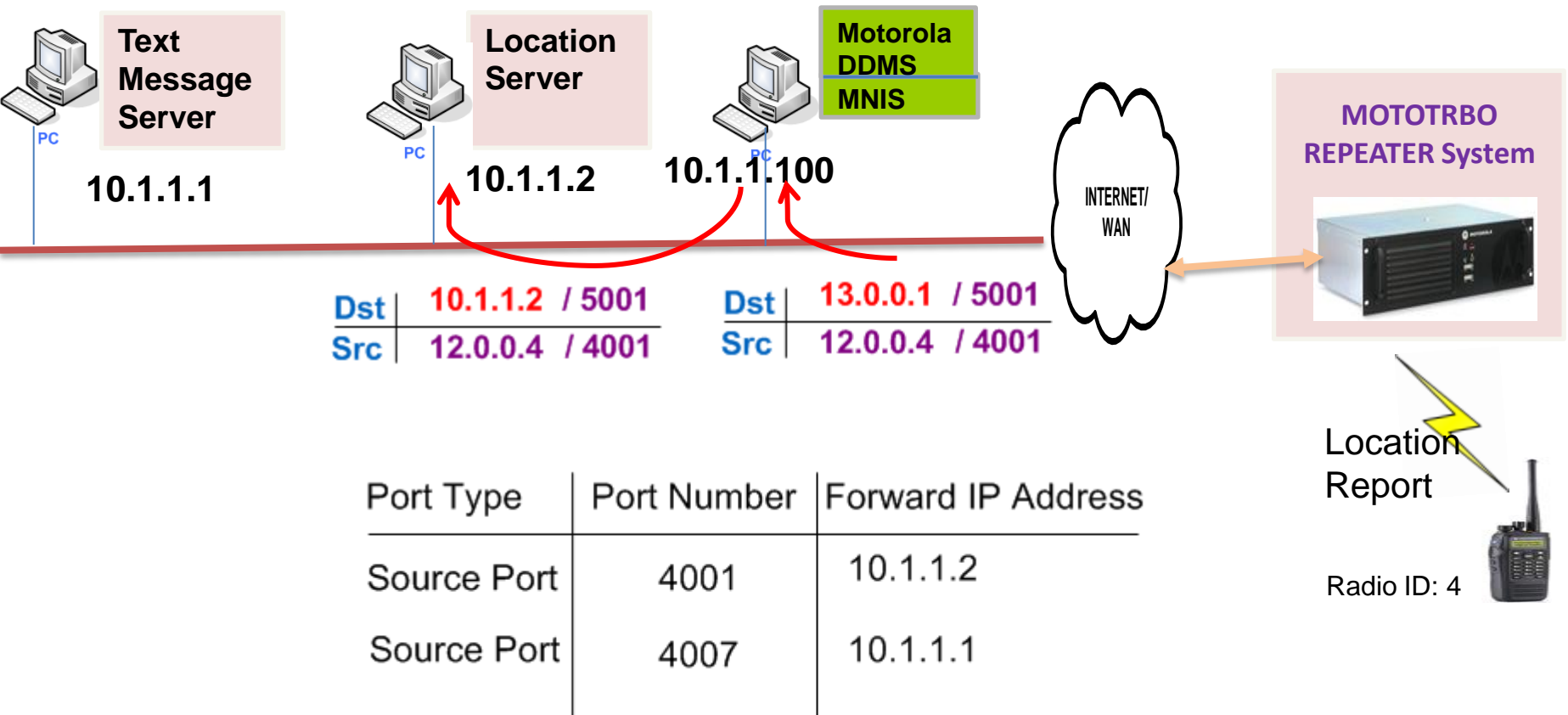
Multiple Applications – Destination Port Forwarding

- Multiple application co-exists in the same system
- Raw Data Support

Dst	10.1.1.2 / 5001
Src	12.0.0.4 / 4001

Dst	13.0.0.1 / 5001
Src	12.0.0.4 / 4001

Port Type	Port Number	Forward IP Address
Destination Port	5001	10.1.1.2
Destination Port	6001	10.1.1.1

Location Server 2
Port: 6001
10.1.1.1

Location Server 1
Port: 5001
10.1.1.2

Motorola DDMS
MNIS
10.1.1.100

INTERNET/WAN

MOTOTRBO REPEATER System

Location Report to Server 1

Radio ID: 4
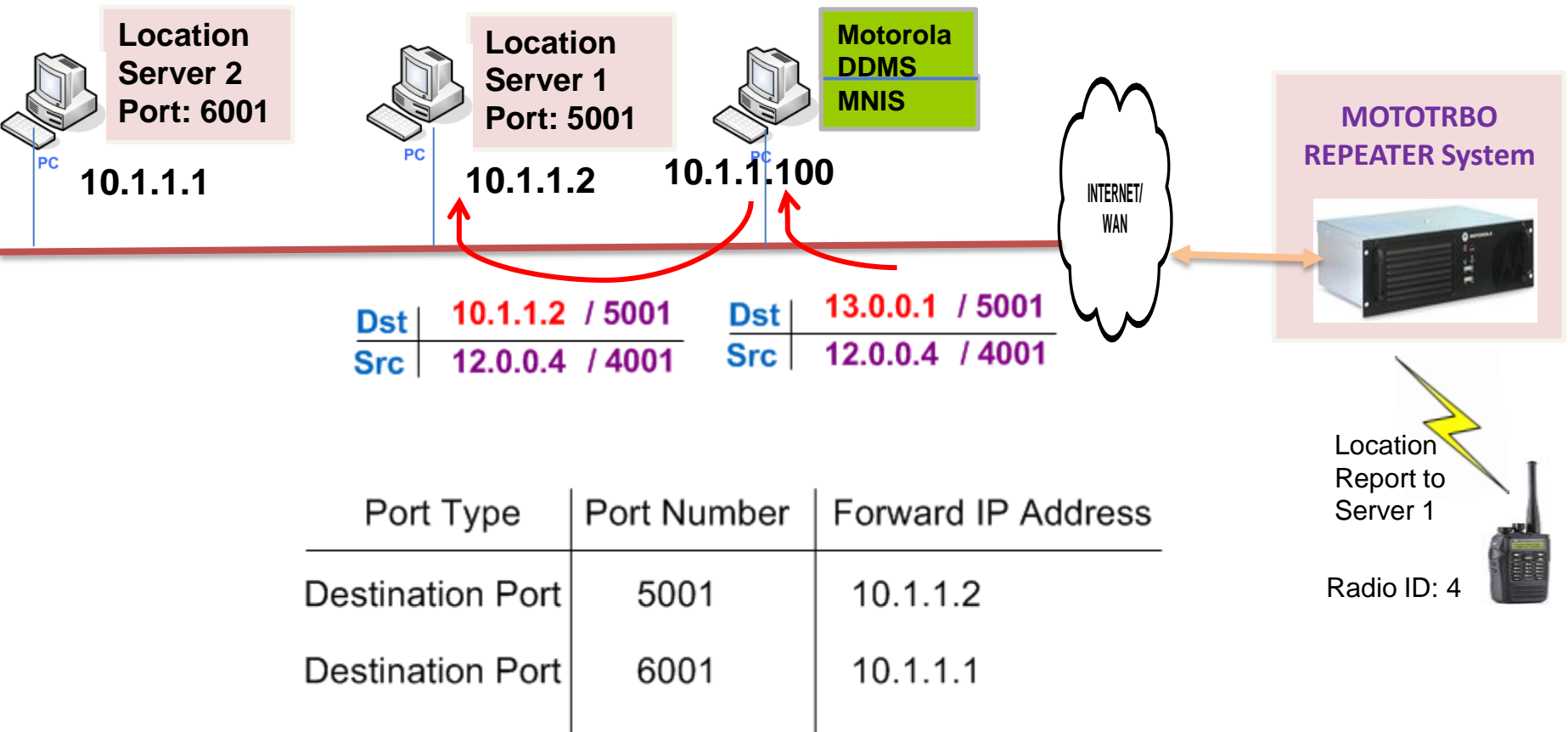
Multiple Applications Support – Destination Port Forwarding

- Multiple application co-exists in the same system
- Raw Data Support

App Server Port: 6001

Motorola DDMS MNIS

MOTOTRBO REPEATER System

App Client Port: xxxx

10.1.1.2   10.1.1.100

INTERNET/ WAN

Radio ID: 4   13.0.0.4

Dst	10.1.1.2 / 6001
Src	13.0.0.4 / xxxx

Dst	13.0.0.1 / 6001
Src	13.0.0.4 / xxxx

Dst	13.0.0.1 / 6001
Src	13.0.0.4 / xxxx

Port Type	Port Number	Forward IP Address
Destination Port	6001	10.1.1.2
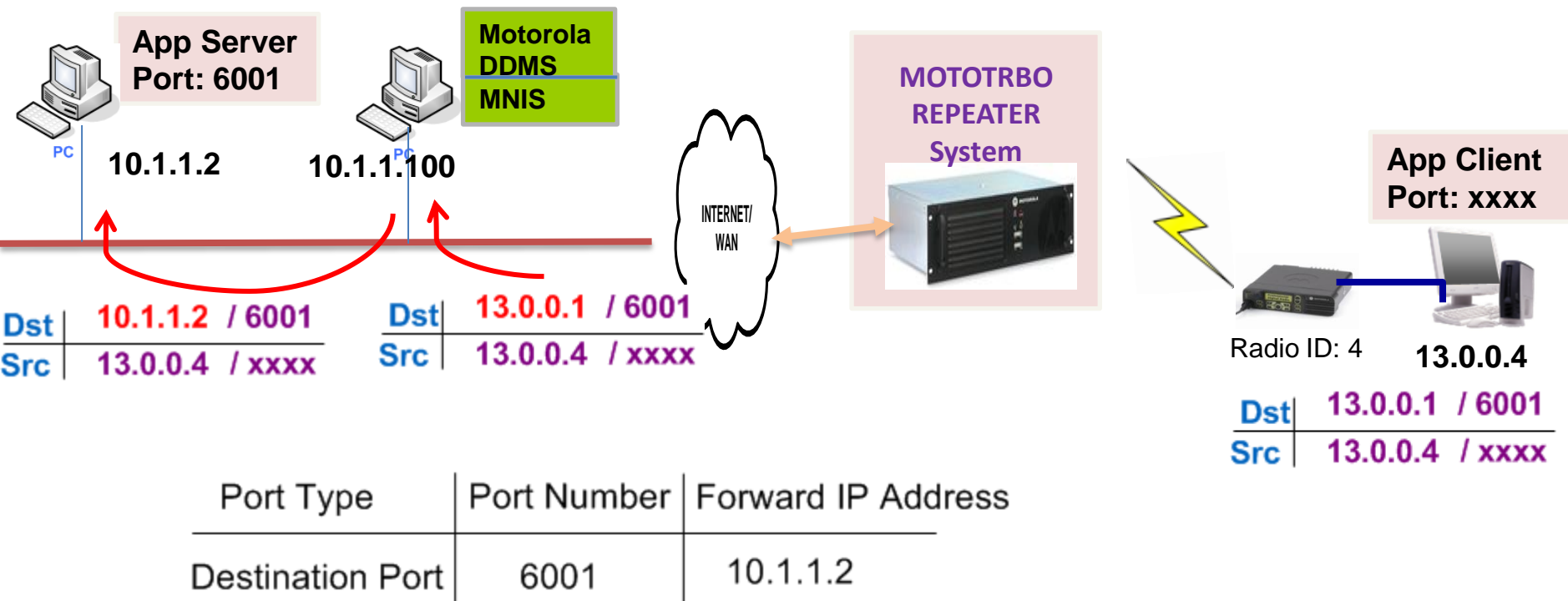
MNIS Based Deployment

Advantages:

- Easy to set up
- Support all the data services
- Low Equipment Cost
- IP connection into the radio system, does not have to be within RF coverage
- Support 16 talkgroup ranges
- Use Local GPS Revert channel to increase the GPS capacity

Data Application Server

IP Connection — Internet / WAN — IP Connection

MNIS & Motorola DDMS

Repeater System (Conventional, IP Site Connect, Capacity Plus, or Linked Capacity Plus)

Digital Radio
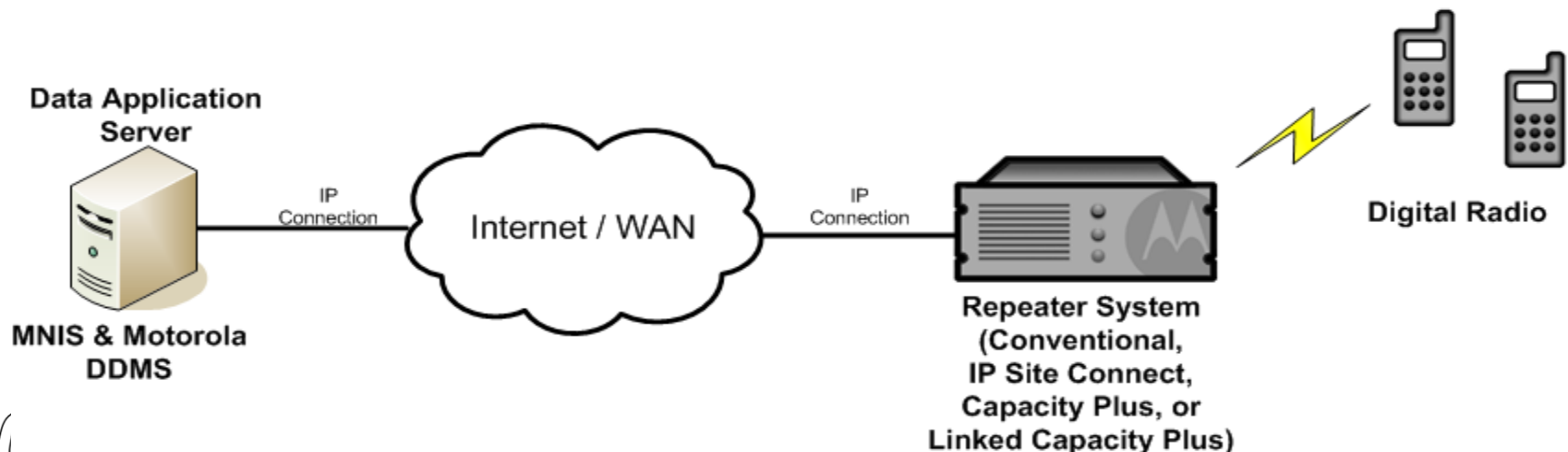
Applications on Separate Machine from MNIS

- Application runs on non-Windows platform
- MNIS does the Network Address Translation

CAI Network Routing

CAI Network Routing

Enable IP Forwarding

Text Message Server

Location Server

Motorola DDMS
MNIS

10.1.1.1

10.1.1.2

10.1.1.100

INTERNET/ WAN

MOTOTRBO REPEATER System

Customer Local Area Network Preferred

	Dst	12.0.0.4	4001
	Src	10.1.1.2	5001

	Dst	12.0.0.4	4001
	Src	13.0.0.1	5001

Location Request

Radio ID: 4

MOTOTRBO™